

# Posttraumatic Stress Disorder in Maltreated Youth: A Review of Contemporary Research and Thought

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**Abstract** Youths who have been maltreated often experience symptoms of posttraumatic stress disorder (PTSD), and this special population has received increased attention from researchers. Pathways toward maladaptive effects of maltreatment and PTSD are remarkably similar and reflect specific biological diatheses and psychological vulnerabilities that produce wide-ranging self-regulation deficits. Developmental models of effects of maltreatment and of PTSD are thus increasingly intertwined and have begun to inform specialized assessment and treatment strategies for this population. This review covers key aspects of posttraumatic stress disorder in maltreated youth, including epidemiology, symptomatology, outcome, and risk factors as well as assessment and treatment strategies and challenges for these youths.

**Keywords** Posttraumatic stress disorder · Maltreatment · Youth

## Introduction

An important historical aspect of clinical child psychology has been research into issues involving mental health and safety and protection of youth. Psychologists have thus delved substantially into areas such as pediatrics, education, and law, among others. A key area of focus regarding mental health and safety and protection of youth has been maltreatment and its various physical and psychopathological sequelae. One common sequela of maltreatment is

posttraumatic stress disorder (PTSD), and the two constructs share many epidemiological, symptomatological, prognostic, etiological, and clinical characteristics. As such, a burgeoning literature has emerged regarding PTSD in maltreated youth. Indeed, both constructs have informed developmental models of the other and are increasingly intertwined.

We first provide a brief overview of maltreatment in youth before outlining a psychobiological model of effects of maltreatment on youth. One such important effect, PTSD, is then described prior to a more in-depth discussion of the two constructs in tandem. This latter discussion involves the overlap of maltreatment and PTSD with respect to epidemiology, symptomatology, and outcome. The special relationship between maltreatment and PTSD is then illustrated in greater detail by a discussion of risk factors of adult and youth PTSD and how these factors compare to those regarding maltreatment effects. Integrated etiological models are then presented that focus on self-regulation deficits to explain the close relationship between maltreatment and PTSD. This discussion precedes a specific and detailed review of contemporary research examining risk factors for PTSD among maltreated youth. The article concludes with a review of contemporary thought regarding assessment and treatment strategies for maltreated youth with PTSD.

## Maltreatment

The federal Child Abuse Prevention and Treatment Act of 1974 defines youth maltreatment as “(1) any recent act or failure to act on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation; or (2) an act or failure to act which

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presents an imminent risk of serious harm” (US Department of Health and Human Services 2005). The American Psychological Association Committee on Professional Practice and Standards defines maltreatment as “actions that are abusive, neglectful, or otherwise threatening to a child’s welfare” (1998, p. 16). Maltreatment in youth is commonly described in the literature as comprising neglect as well as physical, sexual, and/or psychological maltreatment (Dubowitz and Bennett 2007).

The annual frequency of youth maltreatment across several Western countries (United States, United Kingdom, Canada, and Australia) is substantial for physical abuse (4–16%), sexual abuse (5–10%) psychological abuse (10%), neglect (1–15%), and exposure to intimate partner violence (10–20%). Many (34.6%) who report any kind of maltreatment report more than one type. In contrast, just 1.5–5.0% of youth are reported to protective service agencies each year (Edwards et al. 2003; Gilbert et al. 2009a, b). Maltreatment is closely related to lower family socioeconomic status and younger age of a child. Over four-fifths of fatalities caused by maltreatment occur in children less than 4 years of age. Girls tend to be at greater risk than boys for sexual abuse, though boys tend to be at greater risk than girls for physical, nonsexual abuse and possibly neglect (Faust et al. 2008; Hines et al. 2006).

### Effects of Maltreatment

Repetitive traumatic events such as ongoing and severe maltreatment create widespread biological and psychological effects in youth (van der Kolk 2005). A psychobiological approach is a popular model for conceptualizing these effects. This model involves a cascading sequence of intense, aversive environmental stressors, key changes in biological systems creating poor coping and problematic self-regulation of behavior, subsequent and wide-ranging psychological problems, and devastating long-term effects. This model also assumes a transactional relationship among many variables such as the interplay among biological and familial factors (Cicchetti and Toth 2005). We next provide a synopsis of key research findings regarding this cascading sequence.

Biological effects of maltreatment aside from those directly related to assault include systemic brain changes in growth, maturation, and neural development and plasticity as well as indirect influences of stress, neglect, and poor attachment. These changes can lead to broad cognitive, motor, and sensory dysfunctions and interfere with an ability to integrate information (De Bellis 2004, 2005; Glaser 2000; MacMillan and Munn 2001). More specifically, early trauma can lead to dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis. The HPA axis is

responsible for releasing glucocorticoids to enhance coping with stress. Glucocorticoids that have received great attention in the area of maltreatment include cortisol and adrenocorticotrophic hormone (ACTH). The HPA axis and its glucocorticoids are especially important for responding to stressful situations involving novelty, negative emotional content, and feelings of lack of control. Cortisol and ACTH secretion lead to increased arousal as well as inhibition of less necessary bodily systems to help a person cope with a stressor (Carpenter et al. 2007; Heim and Nemeroff 2009).

Glucocorticoids are also a key part of a negative feedback loop with the hippocampus that signals the hypothalamus to end glucocorticoid release. Decreased cortisol secretion over time can thus lead to sustained activation of neural and other systems involved in reactions to stress and fear. Indeed, glucocorticoid responses occur in conjunction with effects on serotonergic, noradrenergic, cortical, and other brain systems. Maladaptive HPA axis functioning may thus involve failure to activate when necessary, activation when unnecessary, or failure to end glucocorticoid release when necessary (Handwerger 2009; Van Voorhees and Scarpa 2004). Such dysfunction may be a key part of allostatic overload in maltreated youth (Grassi-Oliveira et al. 2008; McEwen 2008).

The HPA axis is not fully developed at birth and is thus subject to environmental experiences that shape its activity. Most children experience a decline in HPA activity during preschool years as they learn to cope with stressors, identify most threats as mild, and receive appropriate and supportive feedback from parents. Children faced with abusive parents, however, may be at risk for poor regulation of the HPA axis. Secure attachment status, appropriate social/parental feedback, and responsible and sensitive parental care appear to be especially important influences on appropriate HPA axis development in the early years (Gunnar and Quevedo 2008; Tarullo and Gunnar 2006).

Disorganized attachment following severe maltreatment from a caregiver can lead to significant elevations in cortisol secretion during toddlerhood. School-aged children who have been physically and sexually maltreated often exhibit substantial elevations in cortisol as well. In addition, increased ACTH levels have been found among adults with a history of maltreatment (Watts-English et al. 2006). Conversely, however, lower cortisol levels have been reported for neglected and severely deprived children, even into adulthood (Bruce et al. 2008; Cicchetti and Rogosch 2001; Gunnar and Quevedo 2008; van der Vegt et al. 2009).

Dysregulation of glucocorticoids over an extended period of time has been linked to anxiety and mood disorders as well as deficits in learning, memory, and response inhibition. HPA axis dysregulation may thus be an

important conduit between early trauma such as maltreatment and subsequent psychiatric disorder. Another possibility, however, is that children with HPA axis dysregulation act aggressively and otherwise inappropriately, leading to maladaptive disciplinary practices (Shea et al. 2004; Van Voorhees and Scarpa 2004).

Findings regarding HPA axis dysregulation and psychiatric disorder among maltreated children are not universal, however. One reason may be that onset of puberty and genetic factors help moderate cortisol levels (Tarullo and Gunnar 2006). Others contend that resilient children recover quickly from stressful experiences or that isolated traumatic episodes may not lead to widespread biological changes (Shea et al. 2004; van der Kolk 2005). In addition, some children are perhaps buffered from major HPA axis or other biological effects following maltreatment, perhaps via certain genotypes, good affect regulation and cognitive functioning, positive self-concept, social support, proximity to a nonoffending and caring parent, cultural factors, key learning experiences, or even extended dissociation (Cook et al. 2005; Kaufman et al. 2004; Luthar et al. 2000; Manly et al. 2001; Perry 2008; Teicher et al. 2002). Older age of onset of maltreatment and gender may be protective factors as well (Kaplow and Widom 2007). Indeed, not all maltreated youth necessarily develop major psychological problems (Rind et al. 1998).

Many maltreated youth, however, likely do experience HPA axis dysregulation, which can relate to major brain system dysfunctions. Increased ventricle size, smaller corpus callosum, and disruptions of the prefrontal cortex, hippocampus, and anterior cingulate are among the more robust findings in individuals having experienced physical or sexual abuse. Memory, learning, and spatial information processing may thus be affected (Watts-English et al. 2006).

Trauma early in life can also increase sympathetic nervous system responsiveness and affect serotonergic, noradrenergic, and dopaminergic systems. Changes in these systems could help explain the presence of later psychiatric disorders such as anxiety or depression (Kaufman and Charney 2001). All of these changes can be greatly moderated by genetic and familial influences, however. Maltreated children also demonstrate blunted acoustic startle responses and greater amplitudes of event-related potentials (i.e., greater sensitivity) to angry faces. These findings perhaps reflect significant impairments of the sympathetic and parasympathetic nervous systems as well as key neurochemical and hormonal systems (Cicchetti and Toth 2005).

HPA axis dysregulation, structural brain changes, and other biological diatheses in maltreated children may facilitate serious psychological effects. These psychological effects generally include disruption of key developmental

achievements in motor, emotional, behavioral, language, social, academic, and cognitive skills (De Bellis 2001; Gilbert et al. 2009b). These widespread disruptions can produce a general inability to sufficiently integrate physical sensations, emotions, and cognitions and thus lead to disorganized methods for behavioral self-regulation and coping with stress. In essence, chronically maltreated youth have great difficulty understanding their surrounding environment and may not develop or execute appropriate methods for coping with stress or solving problems. Problems in emotional and behavioral self-regulation can then lead to excessive anxiety, depression, cognitive distortions, somatization, dissociation, aggression, impulsivity, suspiciousness, and other systemic maladaptive responses (Kaplow and Widom 2007; Putnam 2003; van der Kolk 2005).

Indeed, maltreatment is linked to a plethora of internalizing and externalizing behavior problems, including reactive attachment disorder, substance abuse, emotional instability, anxiety, depression, suicidality and other self-destructive behavior, eating disorder, and disruptive behavior (Bergen et al. 2003; Haugaard 2004a; Johnson et al. 2002; Kaufman 2008; Stirling and Amaya-Jackson 2008; Thompson et al. 2003). Other problems include increased risk for unsafe sexual behavior, obesity, low self-esteem, criminal behavior, and cognitive, language, and developmental delay (Haugaard 2003; Veltman and Browne 2001).

Intense psychological problems such as these can translate into long-term effects as well. Common long-term effects of maltreatment include school failure and absenteeism, less anticipation of attending college, social and thought problems, physical and sexual revictimization, violence perpetration, and various psychopathologies such as depression, substance abuse, personality disorder, and posttraumatic stress and other anxiety disorders in adulthood (Arias 2004; Harris et al. 2007; Kaplow and Widom 2007; Kaufman and Charney 2001; Lansford et al. 2002). The main focus of this article is the relationship between maltreatment and posttraumatic stress disorder in youth. This disorder is thus briefly described next.

### Posttraumatic Stress Disorder in Youth

Posttraumatic stress disorder (PTSD) may occur following an extreme stressor involving threat to one's physical integrity, witnessing such a threat occur to someone else, or learning of threat or actual harm to close associates, such as family members. Reaction to such a stressor must involve intense fear, helplessness, horror, or, in the case of youth, disorganized or agitated behavior. PTSD can be diagnosed only if a person experiences specific reactions following the traumatic event. These reactions include persistent reexperiencing of the event, persistence avoidance of

stimuli associated with the event and numbing of general responsiveness, and persistent symptoms of increased arousal. Symptoms must last at least 1 month and cause significant impairment in functioning (American Psychiatric Association 2000).

Persistent reexperiencing of a traumatic event may occur in the form of distressing memories, dreams, flashbacks, and psychological and physical distress upon exposure to internal or external stimuli that resemble the traumatic event. In children, however, repetitive play surrounding aspects of the trauma, frightening dreams without clear content, and trauma-specific reenactment may occur instead. Examples include crashing toy cars, dreaming of monsters, and acting out aspects of a trauma via pretend play (APA 2000). Symptoms of persistent avoidance of stimuli associated with trauma and numbing of general responsiveness as well as increased arousal are in Table 1.

Traumas most closely linked to PTSD in youth include violent death of a loved one, rape, coercion, or victimization from physical violence (Copeland et al. 2007). Maltreatment is a particularly salient trauma for PTSD in youth because it may involve physical violence, invasive contact such as sexual penetration, injury, and coercion. Maltreatment can also lead to ancillary traumas such as separation from family members or homelessness (Davidson et al. 2000; Davis and Siegel 2000; King et al. 2000a, 2003;

Koenen et al. 2007). Of course, other extreme traumatic events can also produce PTSD. Examples include caregiver loss, wartime experiences, natural disasters, terrorist attacks, and torture (Daud et al. 2008; Hasanović et al. 2006; Mullett-Hume et al. 2008; Pina et al. 2008; Taylor et al. 2009). Multiple traumas are more likely to lead to severe PTSD symptoms and depression among adolescents than single event trauma (Suliman et al. 2009).

Older children and adolescents with PTSD may resemble adult profiles with respect to symptomatology, but very young children often show a different clinical picture. Very young children tend to show less avoidance and have difficulty with the verbal expressiveness needed to show evidence of some PTSD symptoms. With respect to very young children exposed to domestic violence, common reactions include fear, numbing, increased arousal, aggression, temperamental difficulty, and reexperiencing. Assessing symptoms in very young children via parent report can be quite problematic, however, and the relational context of PTSD in children is often underevaluated (Bogat et al. 2006; Levendosky et al. 2002; Scheeringa et al. 2001; Stafford et al. 2003).

Some thus believe that the DSM criteria for PTSD should be modified for young children, such as lowering the threshold for avoidance behavior or considering variants of the disorder (Portnova 2007; Scheeringa et al. 2003, 2006).

**Table 1** Summary of diagnostic criteria for posttraumatic stress disorder

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Symptoms of PTSD-based persistent reexperience of traumatic event

- Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions (in young children, repetitive play may occur in which themes or aspects of the trauma are expressed)
- Recurrent distressing dreams of the event (in children, there may be frightening dreams without recognizable content)
- Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated) (in young children, trauma-specific reenactment)
- Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event
- Physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

Symptoms of PTSD-based avoidance of stimuli and numbing of general responsiveness

- Efforts to avoid thoughts, feelings, or conversations associated with the trauma
- Efforts to avoid activities, places, or people that arouse recollections of the trauma
- Inability to recall an important aspect of the trauma
- Markedly diminished interest or participation in significant activities
- Feeling of detachment or estrangement from others
- Restricted range of affect
- Sense of foreshortened future

Symptoms of PTSD-based increased arousal

- Difficulty falling or staying asleep
  - Irritability or outbursts of anger
  - Difficulty concentrating
  - Hypervigilance
  - Exaggerated startle response
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Source: APA (2000)

Others claim that the best nosological model of PTSD in youths includes dimensions of intrusion/active avoidance, numbing/passive avoidance, and arousal (Anthony et al. 2005). van der Kolk (2005) also argued that a diagnosis of PTSD in youth demands a more developmentally sensitive conceptualization that better reflects the sweeping effects of maltreatment (see later etiology section).

A wide-ranging epidemiological study revealed that 67.8% of youth ( $n = 1,420$ ) experienced at least one traumatic event by age 16 years. In addition, 9.1% of youths had a painful recall of a traumatic event, 2.2% displayed subclinical PTSD, and 0.4% displayed PTSD. Rates of PTSD were higher for girls (0.7%) than boys (0.1%) and for adolescents than children (Copeland et al. 2007). Symptoms of PTSD in young children tend to be quite persistent over time (Scheeringa 2006; Scheeringa et al. 2005; Yule 2001).

PTSD in youth is commonly comorbid with other anxiety, mood, and psychotic disorders as well as substance dependence, attention deficit hyperactivity disorder, and suicidal ideation (Davis and Siegel 2000; Reed et al. 2007). Youths with PTSD symptoms show more general internalizing problems, anxiety, depression, social withdrawal, somatic complaints, delinquent and aggressive behavior, and social, thought, and attention problems than youths without such symptoms (Gellman and Delucia-Waack 2006; Saigh et al. 2002).

As mentioned, maltreatment is a particularly salient trauma for PTSD in youth. Researchers have thus begun to gravitate more toward the study of these constructs in tandem at an epidemiological/phenomenological level and an etiological level. We begin by exploring the epidemiology and phenomenology of PTSD and child maltreatment in the next several sections before proceeding to extended discussions of specific risk factors and integrated etiological theories.

### PTSD and Maltreatment: Epidemiology

Researchers estimate that 21–50% of sexually abused youth display PTSD, though the range is generally higher (42–90%) in clinical samples. Up to 50% of physically abused youths may display PTSD. Youths exposed to intimate partner or domestic violence, which is sometimes associated with maltreatment or described as psychological maltreatment, display substantial rates of PTSD as well (Carpenter and Stacks 2009; Lehmann 2000; Margolin and Gordis 2000). One-third to one-half of neglected children who witness domestic violence, for example, have PTSD symptoms. PTSD in maltreated children commonly occurs following disclosure of the abuse, though disclosure latency is unrelated to PTSD (Broman-Fulks et al. 2007).

Childhood sexual abuse produces a substantial effect size regarding outcome toward PTSD (.40), especially for reexperiencing symptoms (Paolucci et al. 2001). Emotional abuse is also an excellent predictor of all aspects of PTSD symptomatology (Sullivan et al. 2006). PTSD is especially likely, however, in maltreatment cases involving physical and sexual abuse, longer duration of maltreatment, threat or force, feelings of guilt, exaggerated startle response, and a perception that one has been victimized (Carrion et al. 2002; Kolko et al. 2002; Romero et al. 2009; Tyler 2002).

Sexually abused youth tend to show more reexperiencing, avoidance, and hyperarousal symptoms of PTSD than physically abused youth. PTSD following sexual abuse tends to be more common among girls than boys, but this finding is not universally supported. Girls tend to show more PTSD-related intrusive thoughts and hyperarousal than boys but equal levels of avoidance. Girls may tend to experience more of the type of trauma, especially sexual abuse or assault, most closely related to later PTSD symptoms. Boys, however, may be more likely to witness the death of a loved one than girls (Davis and Siegel 2000; De Bellis and Van Dillen 2005; Reebye et al. 2000; Silva et al. 2000; Tolin and Foa 2006; Walker et al. 2004). Earlier age of report of physical, sexual, or multiple types of maltreatment is significantly related to later PTSD symptoms as well (English et al. 2005; Pfefferbaum 2005).

Youths may also be at risk for maltreatment and PTSD based on variables other than gender or age. Stewart et al. (2004) found that 82.7% of homeless youth had been physically or sexually victimized and that 17.7% had symptoms consistent with a diagnosis of PTSD. Rates of PTSD did not differ by gender, but girls did have more severe symptoms and showed more intrusive thoughts, difficulty concentrating, anger/irritability, avoidance, and detachment than boys. Gwadz et al. (2007) examined youths aged 15–23 years who were homeless or at risk for homelessness and found that 85.9% experienced at least one traumatic event, most typically sexual trauma or physical assault. PTSD was more typical of girls (8.3%) than boys (0.0%), as were symptoms of each major dimension of the disorder: reexperiencing, avoidance, and hyperarousal.

Many forensic inpatients in one study experienced physical abuse (52%) or neglect (59%) and 44% had a diagnosis of PTSD at some point in their life (Spitzer et al. 2006). Among youths in treatment for alcohol use disorders, several had previously experienced sexual abuse (19%) or assault (36%) or witnessed domestic (33%) or community (25%) violence. Rates of partial or full PTSD for each trauma type were 42, 42, 33, and 33%, respectively. Sexual abuse and high psychiatric symptom severity were most predictive of PTSD symptoms (Hawke et al. 2009). Others have also found that exposure to community



violence is a significant predictor of PTSD among adolescents (Fowler et al. 2009).

Jarvis et al. (2005) found that PTSD symptoms in children with mothers in domestic violence emergency shelters were associated most with frequent interadult physical violence and longer duration of violence. The children showed moderate (40.0%), severe (50.0%), or very severe (10.0%) PTSD symptoms. Mertin and Mohr (2002) similarly found that 20% of children of mothers who had been in shelters following domestic violence had PTSD, especially distressing thoughts, avoidance, hypervigilance, and sleep difficulties. McCloskey and Walker (2000) oversampled mothers who had been in shelters following family violence and found that 15% of their children met criteria for PTSD. Main predictors of PTSD in this sample included abusive home background, exposure to crime, and death or illness of a family member or friend.

Youths referred for a psychological evaluation by a court have also been found to display high rates of maltreatment and a modest rate of PTSD (5.3%) that was equal across boys and girls. Girls tended to have more frequent symptoms than boys, however, especially for reexperiencing and hyperarousal (Brosky and Lally 2004). Among two large samples of adolescent female juvenile offenders, 33–37% had PTSD and 55–77% of these cases were precipitated by sexual abuse (Ariga et al. 2008; Dixon et al. 2005). Among incarcerated youth, nearly all of whom were exposed to a violent act, 28% of boys and 52% of girls met criteria for PTSD (Wood et al. 2002). Among male juvenile sex offenders, 95% experienced a traumatic event (especially physical or sexual abuse), and 65% met criteria for PTSD (McMackin et al. 2002).

A close link between maltreatment and PTSD has been reported in other countries as well. Elklit (2002) surveyed 390 eighth-graders in Denmark and found that some had been *directly* or *indirectly* exposed to physical abuse (3.6/7.7%), severe childhood neglect (3.1/5.6%), rape (1.8/4.9%), or sexual abuse (1.5/3.8%), among many other traumas. Rates of PTSD among girls and boys were most substantial for those experiencing sexual abuse (60.0/100.0%), physical abuse (37.5/16.7%), severe childhood neglect (28.6/0.0%), or rape (20.0/50.0%). Sebre et al. (2004) examined 1,145 children aged 10–14 years in several Eastern European countries. Rates of emotional and physical abuse were reported for Latvia (28.8/17.4%), Lithuania (33.3/26.0%), Macedonia (12.5/12.2%), and Moldova (32.1/29.7%). Trauma-related symptoms were highest for Latvia and Lithuania, countries where parental overuse of alcohol was significantly correlated with emotional and physical abuse.

Suliman et al. (2005) reviewed several studies of South African youth and found that rates of trauma exposure ranged from 40 to 100% and rates of PTSD ranged from 6

to 22%. Seedat et al. (2000) also surveyed South African adolescents and found that some reported sexual assault (12.4%) and that 32.4% of these youths met criteria for PTSD. Including the entire sample ( $n = 307$ ), 12.1% met criteria for PTSD. Catani et al. (2008) found that maltreatment can exacerbate effects of war and natural disaster to enhance risk for PTSD in Tamil school children. Grassi-Oliveira and Stein (2008) found that childhood emotional, sexual, and physical abuse as well as neglect—and especially emotional neglect—were significant predictors of PTSD and emotional distress in Brazilian adults.

Zoroglu et al. (2003) found that Turkish adolescents evidenced significant rates of neglect (16.5%) as well as emotional (15.9%), physical (13.5%), and sexual (10.7%) abuse. One aspect of PTSD, dissociation, was more evident in these youths than youths with no such history, and especially in those experiencing multiple types of maltreatment. Dissociation was also highly predictive of suicide attempt and self-mutilation among maltreated youths. Turkish youths exposed to an earthquake have also shown severe or very severe levels of PTSD (Bal and Jensen 2007). Hoksbergen et al. (2003) examined 80 children adopted from Romania into the Netherlands and found that 20.0% of boys and girls demonstrated clinical PTSD. A comparison with youths without PTSD revealed no age, health, or family differences but youths with PTSD did show many more behavioral problems listed on the Child Behavior Checklist.

In the United States, rates of child maltreatment and overall traumatic events differ little across ethnic groups but reported cases of maltreatment are disproportionate among African American, Native American, and Hispanic children (Costello et al. 2002; Westby 2007). Rates of childhood PTSD across American ethnic groups remain unclear, though minority youth may display higher rates of PTSD because of greater exposure to racism and neighborhood, racial, school, and other violence (Khaylis et al. 2007; Richards et al. 2004; Sanchez-Hucles 1998; Zyromski 2007). Among incarcerated youths exposed to high rates of trauma and violence, PTSD rates do appear different for Hispanic boys and girls (19.6/16.9%), African Americans (9.2/14.7%), and non-Hispanic Whites (8.0/10.5%) (Abram et al. 2004). Others have found that minority status is particularly correlated with arousal/avoidance and intrusive/reexperiencing symptoms of PTSD in maltreated youth (Rossman and Ho 2000).

Other groups may also be at special risk for maltreatment and PTSD development. Gnanadesikan et al. (2005) examined 349 Native American youth aged 15–24 and found that those who experienced sexual trauma (rape, molestation, sexual assault) had the highest prevalence of PTSD (48.1%). Sexual trauma and number of overall traumas (6+) were significant predictors of PTSD.

Mennen (2004) found that 48.4% of maltreated Mexican–American children scored above a cutoff for chronic PTSD and that 34.5% scored above a cutoff for acute PTSD. This result tended to be stronger for Spanish-speaking than English-speaking children. Others have found, however, that PTSD is less common among homeless female youths of minority status than Whites (Gwadz et al. 2007).

### PTSD and Maltreatment: Symptomatology and Outcome

PTSD in maltreated youth is associated with many types of behavior problems. Prominent examples include somatic complaints, social withdrawal, fear, depression, social and cognitive problems, poor school performance and social competence, and delinquent and aggressive behavior (Hoksbergen et al. 2003; Rossman and Ho 2000). PTSD reexperiencing and avoidance/numbing symptoms further mediate a relationship between childhood sexual abuse and nonsuicidal self-injury (Weierich and Nock 2008). Trauma-related symptoms also mediate a relationship between child maltreatment and dating violence perpetration during mid-adolescence (Wekerle et al. 2001; Wolfe et al. 2004). Maltreated boys with symptoms of posttraumatic stress are at particular risk of using threatening behaviors or physical abuse against dating partners (Wolfe et al. 2001). Youths with PTSD demonstrate a stronger relationship between exposure to parental violence and interpersonal aggression toward friends or romantic partners than youths without PTSD (Moretti et al. 2006).

Common comorbid diagnoses in maltreated children with PTSD or trauma-related symptoms include attention deficit hyperactivity disorder, oppositional defiant and conduct disorders, substance abuse, and anxiety, mood, psychotic, and adjustment disorders. Oppositional defiant disorder is specifically linked to hyperarousal and hypervigilance symptoms in youths with PTSD symptoms. Many symptoms related to PTSD in maltreated youth mimic these disorders—such as impulsivity, labile mood, dysphoria, social withdrawal, difficulty concentrating, restlessness, and irritability—which can lead to misdiagnosis and inappropriate interventions. The presence of trauma symptoms can complicate treatment for other problems as well (Ariga et al. 2008; Dixon et al. 2005; Ford et al. 2000; Schumacher et al. 2006; Stevens et al. 2003; Titus et al. 2003; Weinstein et al. 2000).

PTSD in maltreated youth is thus associated with great daily impairment in functioning, including sleep and appetite disturbances, social withdrawal, sadness, avoidance, excessive worry, somatic complaints, inattentiveness, and family and academic problems (Avery et al. 2000). These problems may be more pronounced in sexually

abused youth, especially with respect to aggression, thought problems, dissociation, avoidance, anxiety, and depression (Tremblay et al. 2000).

The outcome of maltreated youths with respect to PTSD remains in need of further study. Famularo et al. (1996) found that only 32.7% of severely maltreated children continued to meet criteria for PTSD over a 2-year period. Others indicate, however, that PTSD in maltreated youth can be quite stable over time because of the repetitive and abusive nature of the stressor (Arias 2004; Fletcher 2003). Storr et al. (2007) followed hundreds of youths from first grade to adulthood and found that those with substantial aggressive or disruptive behavior problems were likely to experience assaultive violence but not other traumas or PTSD following a traumatic event. Participants with high levels of depression and anxiety, however, were more likely to experience PTSD following a traumatic event. A 12-year longitudinal study of maltreated kindergarteners revealed a significantly greater PTSD symptomatology level at grade 11 compared to children who had not been maltreated (Lansford et al. 2002).

Chronic PTSD in maltreated youth is linked closely to increased risk for suicide, substance abuse, and brain and health problems (Brown 2005). Many adults meet criteria for PTSD if they experienced sexual abuse (37.5%), physical abuse (32.7%), or neglect (30.6%) in childhood. Significant predictors of lifetime PTSD following victimization include behavior problems, marital disruption, substance abuse, and parent-based criminal behavior (Widom 1999). A combination of child maltreatment and PTSD symptoms has also been found predictive of higher college dropout rates (Duncan 2000).

Data regarding epidemiology, symptomatology, and outcome clearly reveal an intimate and profound relationship between child maltreatment and PTSD. Emerging research regarding risk factors for PTSD further confirms this special relationship. The following sections outline key risk factors and integrated etiological theories of PTSD in adults and youth, which reveal a remarkable similarity to the biological and psychological effects noted earlier for child maltreatment. Following this discussion will be a review of contemporary research focused specifically on PTSD in maltreated youth.

### Major Risk Factors of Posttraumatic Stress Disorder

Risk factors of posttraumatic stress disorder parallel the psychobiological model of cascading events described earlier regarding the pervasive, long-term effects often seen from maltreatment. This section briefly reviews the literature on risk factors of PTSD that pertain to youth and adults. This review precedes a discussion of current

integrative etiological theories surrounding PTSD that provides a context for a more detailed discussion of PTSD in maltreated youth.

Discussions of childhood PTSD begin, of course, with a particular trauma. The severity, duration, frequency, unpredictability, and proximity of a threatening, harmful, and uncontrollable stressor are considered important risk factors for the eventual development of PTSD. Trauma may involve a single event or, in many maltreatment cases, repeated events that may become predictable over time. As mentioned, traumas most closely linked to PTSD in youth include maltreatment and particularly violent death of a loved one, rape, coercion, or victimization from physical violence (Copeland et al. 2007). Prior trauma (i.e., preceding the contemporary trauma) and history of stressful life events are particularly acute risk factors for PTSD development in youth (Fletcher 2003; Flouri 2005; McKnight et al. 2004; Pandit and Shah 2000).

Diatheses important for PTSD development, in conjunction with a traumatic event, include key genetic and neurobiological variables. Genetics may play a role in the development of childhood PTSD, but this topic has not been adequately studied in youth (Dyregrov and Yule 2006). Still, parental PTSD is a significant risk factor for childhood PTSD. Children of parents exposed to genocide or terrorism, for example, have generally higher rates of PTSD, lower cortisol, or emotionally reactive behavior themselves (Brand et al. 2006; Nomura and Chemtob 2009; Yehuda and Bierer 2008; Yehuda et al. 2002, 2005). In addition, cortisol levels in children might be affected by having parents with posttraumatic symptoms and mothers who experienced stress during pregnancy (Nugent et al. 2007; Seckl 2004).

Genetic conditions may also predispose adolescents or adults to place themselves in potentially harmful environments (e.g., high risk-of-injury situations, combat), produce brain changes that serve as risk factors for PTSD, enhance vulnerability for PTSD following a traumatic event, and increase risk of comorbid disorders such as generalized anxiety and panic disorder. Researchers have concentrated their focus on dopamine system genes and lean toward the notion of moderate heritability in PTSD symptoms (Koenen 2007; Nugent et al. 2008).

Genetic conditions may relate to key neurobiological changes heavily implicated in PTSD, especially alterations of the HPA axis, an important element noted earlier regarding maltreatment. Cortisol levels tend to be high among children with PTSD but low among adults with PTSD, especially those experiencing multiple-event traumas. Differences in cortisol may relate to adjustment to a stressor over time. Pervanidou (2008) reported longitudinal data indicating that cortisol levels in children 1 month following a traumatic event were high but that levels

reached normality 5 months later. Low cortisol may relate specifically to single-event trauma as well. Another explanation is that high cortisol may follow initial trauma but repeated trauma such as ongoing maltreatment may lead to awareness that another traumatic event is likely to occur in the future. This process then leads to lower cortisol levels and continued activation of the stress response (Handwerger 2009).

Cortisol differences may also be influenced by factors raised earlier regarding maltreatment, especially attachment, comorbidity, and genetics. Resilience is another key modifier because the biochemical components related to PTSD are similar to those involved in resilience and recovery from PTSD (Yehuda et al. 2006). Cognitive appraisals, coping ability, and symptom and personality patterns are likely moderators of cortisol level as well. Lowered cortisol may also be more specific to girls and those having experienced physical or sexual abuse, but findings remain mixed (Heim and Nemeroff 2009; Meeuwisse et al. 2007; Olff et al. 2005).

Changes in the HPA axis may intersect with other biological findings regarding adult PTSD development, including increased sympathetic nervous system activity and norepinephrine, decreased serotonin, and possible alterations in gamma-aminobutyric acid, glutamate, neuropeptide Y, and endogenous opioids (Heim and Nemeroff 2009; Nair and Singh Ajit 2008). Levels of norepinephrine also tend to remain high in youths with PTSD over time, so the stress response in many youths with PTSD may remain active even when unnecessary (Pervanidou 2008). Other key brain changes implicated in adult PTSD etiology include reduced hippocampal volume (perhaps from prolonged glucocorticoid secretion), reduced prefrontal cortex activity, reduced white matter brain volume, increased amygdala activity, and abnormal functioning of the insula. These changes collectively help explain symptoms of hyperarousal, enhanced encoding of fearful and intrusive memories, impulsivity, and other key aspects of PTSD. Whether these brain changes precede or follow symptoms of PTSD remains not completely clear, however (Birmes et al. 2002; Cui et al. 2008; Garfinkel and Liberzon 2009; Heim and Nemeroff 2009; Karl et al. 2006; Rasmusson et al. 2003).

Neuroimaging studies have also examined possible brain alterations in youths with PTSD. Adults with PTSD commonly display reduced hippocampal volume, but this finding appears to be more mixed among youth. Some researchers have found no hippocampal volume changes and others have found greater volume or reduced volume among traumatized youth (Carrion et al. 2007; De Bellis et al. 1999a, b; Tupler and De Bellis 2006). These different findings may reflect, however, the heterogeneous nature of hippocampal development in children (Gogtay et al. 2006).



Other brain changes in youths with PTSD include reductions in size of the corpus callosum, cerebellum, frontal lobe, pons, right temporal lobe, prefrontal cortex, and white matter (Carrion et al. 2001, 2009; Richart et al. 2006; Yang et al. 2004). Conversely, ventricle size and pituitary and superior temporal gyrus volumes have been noted in youths with PTSD (Jackowski et al. 2009). Some of these findings are specific to maltreated children with PTSD and are described in greater detail later. In general, however, youths with PTSD often demonstrate HPA axis and other key changes that may indicate impaired brain development, neuronal loss and poor neurogenesis, and problems in neuronal pruning and myelination (Teicher et al. 2002).

These substantial biological diatheses can precede or interact with potent psychological predispositional factors. A full accounting of all psychological vulnerabilities for PTSD in adults is beyond the scope of this article. Most proposed psychological vulnerabilities for PTSD in adults, however, involve cognitive constructs. The reader is referred to a thorough review of this topic (Elwood et al. 2009), but key points are briefly summarized here prior to a discussion of risk factors more specific to youth.

Cognitive vulnerabilities for PTSD primarily include inability to sufficiently process a traumatic event emotionally, disruptions of previously held and potentially rigid schemas about safety and self and the world, perpetuated beliefs about ongoing threat, impaired habituation of symptoms from ongoing avoidance of trauma-based thoughts, negative self-evaluation regarding competence, and self-blame regarding a traumatic event (see also Marshall et al. 2007; McNally 2006; Moore 2009). These vulnerabilities likely intersect with memory changes in PTSD, especially enhanced fear, biased, and inaccurate retrospective memories (Rubin et al. 2008).

These cognitive and memory vulnerabilities likely relate as well to constructs such as negative attributional style or hopelessness, which may help explain comorbidity with depression and substance abuse and which may be more prevalent among those having experienced interpersonal trauma (Evren et al. 2006). PTSD has been linked particularly to attribution of negative events to external, stable, and uncontrollable causes. Other potential cognitive risk factors for adult PTSD include rumination about causes and consequences of traumatic events (and not the traumatic event itself), anxiety sensitivity, and anticipation and overestimation of threat or danger in ambiguous situations. Factors such as neuroticism, negative affect, disgust, emotional dysregulation, and extreme personality traits are likely influential as well (Elwood et al. 2009).

Cognitive variables can influence older youths as well. Adolescents with PTSD may have powerful cognitive, fear-based representations of a traumatic event that can be

maintained by poor verbal processing of the event, intense emotions such as anger or guilt, maladaptive appraisals of life events and future harm, negative appraisals about one's vulnerability and recovery immediately after trauma, internal causal attributions of negative events, attentional bias toward threat, thought suppression and avoidance, rumination, excessive worry, and distraction or dissociation. Dysfunctional, metacognitive thoughts related to perceived insanity, loss of control or safety, weakness, permanent change, sense of foreshortened future, and subjective sense of danger also help maintain symptoms of PTSD and degrade appropriate coping strategies. Developmental, familial, social, and other changes in a child's life can greatly affect these processes, however (Bryant et al. 2007; Ehlers et al. 2003; Margolin and Vickerman 2007; Meiser-Stedman 2002; Salmon and Bryant 2002; Stallard 2003). Specific research into the cognitive states of maltreated youths with PTSD has burgeoned recently and is described in more detail later.

Adults and youth with PTSD clearly show some overlap with respect to biological and cognitive diatheses, but children obviously face many special circumstances that complicate etiology even further. Examples include early attachment, fluid physical and cognitive development, familial interactions and dynamics, and vulnerability due to dependence on adults for care (Coates and Gaensbauer 2009). Key risk factors that may be especially particular to PTSD in youth are summarized next.

Learning experiences are an important factor in childhood PTSD. Youths may classically condition fear responses and related stimuli with traumatic events. Such responses may become generalized as a youth begins to fear other, related situations. Operant conditioning may then occur when a youth actively avoids thoughts, situations, or reminders of the trauma to reduce fear and anxiety. The fear response thus fails to extinguish, and PTSD symptoms are maintained. Powerful emotional responses in addition to fear that can pervade these learning processes include horror and helplessness (Fletcher 2003; Pandit and Shah 2000). Heflin and Deblinger (2006) proposed that youth with particularly intense classical and operant conditioning processes following maltreatment may be more predisposed to PTSD. Abuse-related cognitions and memories, negative emotions, and even neutral stimuli such as clothing can become powerful conditioned stimuli that, when supported by chronic avoidance and dysfunctional thoughts, can lead to symptoms of PTSD.

Family factors clearly relate to PTSD development in youth as well. In addition to the obvious contribution of maltreatment, parental trauma-related distress, ongoing family disruptions and domestic violence, family history of disorder, low cohesiveness and high conflict, low social support, coercive parenting style, divorce, maladaptive and

disparate parental reactions to trauma, and poor financial resources are general risk factors for childhood PTSD (Afifi et al. 2009; Dyregrov and Yule 2006; Langeland and Olff 2008; Vernberg and Varela 2001). Other contributing familial factors include lack of supervision/neglect, parent psychopathology such as substance abuse or depression, parental avoidance or denial, parental inducement of guilt and anxiety in children, parental modeling of PTSD symptoms, family breakup and irritability/withdrawal, and overprotectiveness (Friedman et al. 2008; Ostrowski et al. 2007; Scheeringa and Zeanah 2001). Conversely, the protective role of grandparent involvement in a child's upbringing may ameliorate risk (Pandit and Shah 2000).

Several other factors could exacerbate or attenuate risk of PTSD development even following a high-magnitude stressor with significant biological, cognitive, learning-based, and familial diatheses. Factors that may exacerbate risk include female gender, younger age, behavioral inhibition, poor health, poor impulse control, comorbidity with depression and other disorders, poverty, media exposure, and adverse political circumstances. Factors that may attenuate risk include resilience, emotional regulation, self-identity, adequate processing of difficult events, secure attachment, maturity of one's biological system, advanced language and cognitive development, good coping behavior and social skills, and broader variables such as culture (Buka et al. 2001; De Bellis and Van Dillen 2005; Elliot and Carnes 2001; Fletcher 2003; Kaplow et al. 2005; Koenen 2006; Pandit and Shah 2000; Scott et al. 2003; van der Kolk 2007; Vernberg and Varela 2001; Weitzman 2005).

### Toward Integrated Models of Maltreatment Effects and PTSD

Integrated models of PTSD in adults generally focus on the interaction between key biological and psychological/environmental vulnerabilities. For example, disruptions in the HPA axis and high levels of anxiety sensitivity may relate to hyperarousal symptoms in PTSD, hippocampal changes and high levels of rumination may relate to memory distortions in PTSD, and genetic vulnerabilities toward depression and high levels of negative affect may relate to avoidance symptoms in PTSD (Elwood et al. 2009). Researchers have gravitated toward gene–environment interaction ( $G \times E$ ) studies in this regard (Koenen 2005; Koenen et al. 2008). Kilpatrick et al. (2007), for example, found that a low-expression variant of the serotonin transporter gene increased risk for PTSD and depression if a person experienced high hurricane exposure and low social support (see also Amstadter et al. 2009). Gravitation toward  $G \times E$  effects has influenced integrated

etiological models of PTSD in youth as well, especially those who have been maltreated.

PTSD development in youth is likely a complicated and convoluted process involving many factors working in tandem to produce intense symptoms. Researchers have begun to formulate developmental models of childhood and later adult PTSD that account for these many factors on a grand scale. Integrative models of PTSD in youth include several variables discussed for adults but with special consideration of factors unique to this younger population. In addition, many researchers emphasize a transactional approach to risk factors for PTSD development in youth, especially with respect to parent and family factors (Fletcher 2003; Koenen 2006; Pandit and Shah 2000; van der Kolk 2007; Vernberg and Varela 2001; Weitzman 2005).

Several researchers have focused on developmental traumatology and the central construct of self-regulation, and especially how individuals differ in exposure to trauma and their responses to trauma (De Bellis 2001, 2002; De Bellis and Van Dillen 2005). More specifically, researchers have theorized about how certain aspects of self-regulation—notably emotion processing and executive functioning—affect the development of PTSD. Emotion processing refers to properly assessing degree of threat as well as regulating arousal following a threat. Deficits in emotion processing could lead to reactions of intense fear, horror, or helplessness to a stressor, which is a criterion for PTSD, as well as intense interpersonal problems (Cloitre et al. 2005).

Executive functioning refers to regulation of goal-directed behavior via cognitive abilities such as memory, planning, and impulse control. Deficits in executive functioning could lead to greater exposure to stressors, inability to adequately address a current stressor, and substantial comorbid problems in persons with PTSD (Koenen 2006; Koenen et al. 2008; Martorell et al. 2009). Studies of traumatized but nonmaltreated youth affirm the presence of substantial verbal IQ and memory and learning deficits (Moradi et al. 2000; Saigh et al. 2006; Scrimin et al. 2009; Yasik et al. 2007).

Several research groups (e.g., De Bellis 2002; Koenen 2006; van der Kolk 2005) theorize that severe disruptions in early childhood naturally lead to neuronal impairment via dysregulation of key brain areas such as the amygdala, HPA axis, hippocampus, and prefrontal cortex. Such dysregulation sets the stage for emotion processing and executive functioning deficits that lead to impaired self-regulation of behavior and its subsequent devastating effects. As researchers work to develop comprehensive etiological models of PTSD with a particular eye on self-regulation, many have turned toward the study of maltreated youths. The study of maltreated youths with PTSD has several advantages, including the fact that a strong

percentage of maltreated youths develop PTSD, that the two populations share common symptomatology, etiological attributes, and outcome, and that many maltreated youths and youths with PTSD display problems of self-regulation.

van der Kolk (2005) further contended that pervasive dysregulation of behavior in response to traumatic stimuli and reminders demands a broader conceptualization of PTSD in youth. Developmental trauma disorder is based on the idea that multiple exposures to various interpersonal stressors, including ongoing maltreatment, necessarily lead to maladaptive subjective experiences and self-regulation deficits on a wide scale (see Table 2). Dysregulation of affective, somatic, behavioral, cognitive, relational, and self-attribution domains are central to the disorder, as are altered expectancies and widespread impairment that reflect emotional processing and executive functioning

**Table 2** Proposed aspects/criteria of developmental trauma disorder

<b>A. Exposure</b>	
	Multiple or chronic exposure to one or more forms of developmentally adverse interpersonal trauma (e.g., abandonment, betrayal, physical assaults, sexual assaults, threats to bodily integrity, coercive practices, emotional abuse, witnessing violence and death)
	Subjective experience (e.g., rage, betrayal, fear, resignation, defeat, shame)
<b>B. Triggered pattern of repeated dysregulation in response to trauma cues</b>	
	Dysregulation (high or low) in presence of cues. Changes persist and do not return to baseline; not reduced in intensity by conscious awareness
	Affective
	Somatic (e.g., physiological, motoric, medical)
	Behavioral (e.g., re-enactment, cutting)
	Cognitive (e.g., thinking that it is happening again, confusion, dissociation, depersonalization)
	Relational (e.g., clinging, oppositional, distrustful, compliant)
	Self-attribution (e.g., self-hate, blame)
<b>C. Persistently altered attributions or expectancies</b>	
	Negative self-attribution
	Distrust of protective caretaker
	Loss of expectancy of protection by others
	Loss of trust in social agencies to protect
	Lack of recourse to social justice/retribution
	Inevitability of future victimization
<b>D. Functional impairment</b>	
	Educational
	Familial
	Peer
	Legal
	Vocational

Source: van der Kolk (2005)

deficits mentioned earlier (see Table 3). Such dysregulation could also lead to PTSD and myriad other disorders such as depression, substance abuse, or personality or eating disorder (Brunello et al. 2001; Cook et al. 2005; Holzer et al. 2008; Kemp et al. 2007; Sansone and Sansone 2007). The specific connection between maltreatment and PTSD vis-à-vis self-regulation deficits provides the overarching context for the remaining sections of this article.

## Risk Factors Regarding Maltreated Youth with PTSD

The remainder of this article is devoted to reviewing the burgeoning literature on the specific relationship between maltreatment and symptoms of posttraumatic stress disorder in youth with respect to risk factors, assessment, and treatment. We generally restrict our discussion to studies that specifically addressed samples of maltreated youth with respect to PTSD. We begin with a summary of evidence regarding primary risk factors in this population followed by separate sections on assessment and treatment of maltreated youths with PTSD. Much of the work to be described has focused on risk factors, but ideas regarding protective factors are also illuminated as applicable.

### Biological Factors

Psychobiological models of PTSD depend heavily on the idea of widespread deficits in emotion processing and executive functioning, particularly in those who have endured long-term exposure to traumatic events such as maltreatment (Frewen and Lanius 2006). As such, one would expect that maltreated youths with PTSD would evince specific brain changes related to dysregulation of behavior and higher-order cognitive processes. Evidence indeed supports the presence of such changes and is summarized here.

Several researchers have focused specifically on aspects of the HPA axis when examining maltreated youths and PTSD, especially cortisol. De Bellis et al. (1999a) found increased cortisol levels among maltreated children (mean age, 10.4 years) with PTSD compared to controls. Elevations of epinephrine, norepinephrine, and dopamine were reported as well among maltreated children. Carrion et al. (2002) also found that children (mean age, 10.7 years) with PTSD exposed to traumatic events that included maltreatment evinced elevated cortisol levels compared to controls. This result applied more to girls than boys. Conversely, however, MacMillan et al. (2009) found that female control adolescents aged 12–16 years showed increased cortisol levels following stress induction but that matched maltreated adolescents (26.2% with PTSD symptoms) showed an attenuated response.

Several reasons may explain these disparate results. One possible explanation is that maltreated youths in the MacMillan study had all experienced neglect, which is associated with low cortisol levels even in preschoolers (Bruce et al. 2008). Rates of neglect were much lower in the Carrion (11%) and De Bellis (0%) studies. Second, as mentioned earlier, onset of puberty may help explain the transition from hypercortisolism in children to hypocortisolism in adolescents and adults; the Carrion and De Bellis studies examined prepubertal children, whereas the MacMillan study involved adolescents. Adolescents may also habituate to chronic exposure to stressful events more so than children (MacMillan et al. 2009).

Such developmental differences in cortisol secretion may be illuminated as well by two key studies. First, Bevans et al. (2008, 2009) examined children (mean age, 10.7 years) who experienced a mean of 2.4 lifetime traumatic events, including possible instances of violence directed at them by a family member. Higher levels of previous (>12 months) and recent (<12 months) trauma related to low morning but high afternoon cortisol levels. The authors speculated that children may have been in the process of trying to cope better with chronic trauma. In addition, PTSD symptoms were greatest for youths who demonstrated high levels of previous and recent trauma and high afternoon cortisol levels. PTSD symptoms in this group were also higher than those with previous and recent trauma but low afternoon cortisol levels.

Thomas and De Bellis (2004) compared pituitary volume (part of the HPA axis) in maltreated children aged 4–17 years with chronic PTSD to nontraumatized youths. Maltreated adolescents with PTSD demonstrated greater pituitary volume than controls, but this difference was not evident in prepubertal children. However, longer duration of maltreatment was significantly correlated with pituitary volume in children but inversely so in adolescents. The authors speculated that children exposed to maltreatment show increased glucocorticoid activity that leads to pituitary hypertrophy that is accentuated by the onset of puberty. Over time, downregulation of pituitary receptors may serve as an adaptive response to such hypertrophy, which may help explain less cortisol secretion in older adolescents and adults.

Problems in emotion regulation and executive functioning in maltreated youths with PTSD may thus result from HPA axis dysregulation but also key structural brain changes. Indeed, maltreated children with PTSD, compared to controls, have been shown to have smaller intracranial, cerebellar, and prefrontal cortical matter as well as smaller right temporal lobe and corpus callosum volume. In addition, maltreated children with PTSD have larger lateral ventricles and more frontal lobe cerebrospinal fluid than controls. Ventricle size was more closely related to boys

than girls (De Bellis and Keshavan 2003; De Bellis et al. 1999b, 2002a; De Bellis and Kuchibhatla 2006).

Brain volumes were inversely correlated with duration of abuse, suggesting that neuronal loss begins at an early age in these children. These changes may be function of cortisol effects, severe stress, malnutrition, and other concomitants of maltreatment. Widespread structural brain changes in maltreated children with PTSD facilitate substantial discontinuities in perception, comprehension, emotional processing, memory, and behavioral responses as well as dissociation, executive functioning deficits, and comorbid psychiatric disorders (De Bellis and Keshavan 2003; De Bellis et al. 1999b, 2002a; De Bellis and Kuchibhatla 2006; Jackowski et al. 2008).

De Bellis et al. (2002b) also found that maltreated children with PTSD displayed larger superior temporal gyrus gray matter volume than controls. The authors speculated that this result may have been due to decreased input from other key brain areas such as the frontal cortex, trauma-related sensitivity to conditioned auditory stimuli, or comorbid anxiety disorder. Neuronal integrity dysfunction in maltreated children with PTSD is also supported by lower ratios of *N*-acetylaspartate to creatine compared to controls (De Bellis et al. 2000).

The hippocampus has also received attention from researchers given adult findings of reduced size and the brain structure's importance in HPA axis functioning and memory. Carrion et al. (2007) examined maltreated children and found that symptoms of PTSD and cortisol level predicted reduction in hippocampal size over a 12–18-month period, which is consistent with adult findings. Conversely, however, Tupler and De Bellis (2006) found increased hippocampal white-matter volume in children with maltreatment-related PTSD compared to controls. A meta-analysis of hippocampal volume studies involving youth and adults revealed no major hippocampal changes in youth but volume deficits in adults (Woon and Hedges 2008). The authors speculated that multiple traumatic events, as experienced by many children in the Carrion study, may correlate with smaller hippocampal volume or that hippocampal changes from chronic maltreatment may not appear until adulthood.

Other studies regarding maltreated children with PTSD may peripherally support the notion of biological dysregulation. Klorman et al. (2003) found reduced acoustic startle responses among maltreated youths compared to controls, a finding comparable to youths with PTSD (Ornitz and Pynoos 1989). These results may reflect attention dysfunction or effects of allostatic load from chronic trauma. Haviland et al. (2006) found that thyroid hormone (free  $T_3$ ) was significantly negatively correlated with PTSD symptoms in recently sexually abused adolescent girls. The authors speculated that physical adaptation



to stress may include conservation of this type of hormone or that depression and numbing reactions relate to low  $T_3$ .

### Attachment and General Family Factors

A discussion of biological diatheses for maladaptive effects of maltreatment and PTSD development intersects naturally with early attachment difficulties. Several researchers have noted that key brain areas—most notably limbic and autonomic nervous systems as well as the hippocampus and amygdala—can be severely impacted by disorganized, disoriented, unresolved, or insecure attachment patterns due to early maltreatment (Buchheim et al. 2006; Schore 2002). Others note that self-regulation deficits in mothers could disrupt attachment with young children (Schechter and Willheim 2009). Whatever the direction of effect, significant brain changes and poor early attachment from maltreatment can lead to rigid or extreme survival-based behaviors, inadequate processing of fear, self-blame, dissociation, and hostility, among other responses. Such responses may then relate to later affect dysregulation, executive functioning deficits, inattention, altered help-seeking, poor coping ability, self-identity confusion, revictimization, and PTSD symptoms, among other problems (Ayoub et al. 2003; Bailey et al. 2007; Cook et al. 2005; Feerick et al. 2002; Stein 2006; Webster et al. 2009).

Empirical work with specific respect to attachment and child maltreatment and PTSD is emerging to preliminarily support these ideas in general. Ruchkin et al. (1998) examined adolescent male rape victims and found that posttraumatic stress level related closely to paternal rejection and low emotional warmth. Parental rejection with child maltreatment and exposure to interparental violence also impact intimate relationship abuse perpetration in adults with PTSD symptoms and social information processing deficits (Taft et al. 2008).

Muller et al. (2000, 2001) examined 66 adults maltreated as children and found that 76% endorsed one of three insecure attachment styles: dismissing, fearful, or preoccupied. Those with most substantial PTSD symptoms experienced fearful and preoccupied attachment styles that reflect negative view of oneself. Stovall-McClough and Cloitre (2006) found that unresolved trauma among adults meant a 7.5-fold increase in likelihood for PTSD, especially avoidant symptoms. Secure adult attachment has also been found to mediate a link between child maltreatment and PTSD symptoms (Twaite and Rodriguez-Srednicki 2004).

Early attachment difficulties can relate as well to broader problematic family factors later in a child's life. Rossman and Ho (2000) examined three groups of community or shelter-based youths exposed to parental violence and/or abuse. PTSD symptoms of intrusive/

reexperiencing and arousal/avoidance were positively associated with low SES, family stressors, spousal verbal and physical aggression, and neighborhood violence and negatively associated with mother availability. Dysphoria was negatively associated with family stressors but highly associated with children who rejected their mother's help. Other researchers indicate that PTSD symptoms commonly occur in youth and parents simultaneously, and adverse parenting has been implicated as a key predictor of PTSD symptoms in trauma-exposed female juvenile offenders (Ariga et al. 2008; Landolt et al. 2003).

### Cognitive Factors

Distorted cognitive processes are clearly central to a dysregulation model of maltreatment effects and PTSD development, and emerging research has illuminated such distortions in maltreated youths with PTSD. For example, Runyon and Kenny (2002) compared youths aged 8–17 years who were maltreated physically or sexually and found that type of abuse and a negative explanatory style best predicted trauma-related distress. This attribution style itself also predicted level of depression. Youths who were maltreated physically displayed less trauma-related distress but were more prone to a negative explanatory style than youths who were maltreated sexually. The authors speculated that youths undergoing sexual abuse often have a supportive nonoffending parent but that youths undergoing physical abuse may experience frequent hostile and negative interactions with both parents.

Other studies indicate that maltreated children with symptoms of PTSD display an attention bias regarding threat. Pine et al. (2005) found that attention bias away from threatening stimuli (facial expression photographs) was associated with severity of physical abuse and PTSD in maltreated children. Masten et al. (2008) found that maltreated youths with PTSD identified fearful faces more quickly than controls without PTSD. The authors speculated that doing so allows youths to adaptively identify and potentially avoid parental fear and threat. Even maltreated preschoolers have been found to score high on an analogue measure of hypervigilance (Frankel et al. 2000). Others have found, however, that nonmaltreated youths with PTSD allocate processing resources toward socially threatening stimuli and away from depression-related stimuli (Dalgleish et al. 2001). In addition, Dalgleish et al. (2000) examined youths with PTSD, some of whom were exposed to interpersonal violence, and found that they estimated negative events would occur more likely to others than to themselves.

Freeman and Beck (2000) examined sexually abused adolescent girls with PTSD in comparison with sexually abused girls without PTSD and a control group using a



modified Stroop procedure. Sexually abused girls with PTSD demonstrated greater color naming interference than controls (but not maltreated girls without PTSD) regardless of content but not necessarily for abuse-related words. Others have found, however, that youths with PTSD, some of whom experienced personal violence events, did name trauma-related words more slowly than neutral words compared to controls (Moradi et al. 1999). Levels of posttraumatic stress in trauma-exposed youths, some of whom were maltreated, also relate significantly to overall anxiety sensitivity as well as concerns about disease, unsteadiness, and mental incapacitation (but not social concerns) (Leen-Feldner et al. 2008).

Lemos-Miller and Kearney (2006) found that trauma-related cognitions were closely related to PTSD among maltreated adolescents at a state-administered residential facility. Three aspects of trauma-related cognitions—negative thoughts about self, negative thoughts about the world, and self-blame—significantly correlated with reexperiencing, avoidance/numbing, increased arousal, and distress aspects of PTSD. The relationship between trauma-related cognitions and PTSD symptoms was mediated and strengthened, however, by level of depression. Maltreatment and PTSD also link to lower self-efficacy or a belief that one is in control of one's emotional experiences, which may help explain the frequency of depression in this population (Diehl and Prout 2002).

Executive functioning deficits are also a key part of a dysregulation hypothesis of maltreatment effects and PTSD, and research findings reveal such deficits. Total traumas and impairment correlate inversely with verbal, performance, and full scale IQ scores among traumatized youths, some of whom were maltreated. Reexperiencing symptoms of PTSD correlate inversely with verbal and full-scale IQ scores as well, suggesting that lower IQ may be a risk factor and/or that higher IQ may be a protective factor in this population (Saltzman et al. 2006). Others have found that maltreated children with PTSD or trauma symptoms perform more poorly on memory, attention, and abstract reasoning/executive function tasks than controls (Beers and De Bellis 2002; Eisen et al. 2007). Poorer performance on specific executive functioning tasks related to working memory, inhibition, auditory attention, deontic reasoning, and processing speed has also been linked closely to familial-based trauma (including physical and sexual maltreatment) and dissociation (DePrince et al. 2008a, b, 2009).

Finally, several treatment outcome studies for maltreated youths and/or youths with PTSD have successfully included a cognitive component (Dalglish et al. 2005). Primary treatment goals in this regard include helping children overcome intense shame, guilt, and anxiety regarding abusive experiences (King et al. 2003). Trauma-

focused cognitive-behavioral therapy, for example, partially focuses on recognizing relationships between thoughts and behaviors and emotions, cognitive processing of abuse experiences, and developing trauma narratives and coping skills (Cohen et al. 2004). Treatment strategies for maltreated youths with PTSD are described in more detail in a later section.

### Dissociation and Affect Dysregulation

Dissociation is often considered an important aspect of a dysregulation hypothesis for PTSD because the process involves failure to successfully manage painful emotional experiences and because the neural bases for dissociation and PTSD are similar (Hopper et al. 2007; Lanius et al. 2006). Dissociation is also a common phenomenon among maltreated youths, occurring in approximately 19–73% of this population and particularly among severely maltreated youth. Dissociation is sometimes difficult to determine in children, however, because the phenomenon may be misperceived as symptomatic of attention deficit hyperactivity, oppositional defiant, psychotic, developmental, cognitive, or mood disorders. In addition, dissociative “freezing” may occur in very young children who move and speak little following an intense stressor (Scott et al. 2003; Silberg 2000).

Dissociation is often believed to be a successful coping strategy for youths currently victimized by maltreatment but a maladaptive strategy if used long-term or generalized to other contexts. A child may avoid intense stimuli associated with victimization, such as specific physical sensations, emotions, or cognitions, and thus prevent their integration into the normal memory process. Dissociation can, however, become a default coping strategy over time that leads to poorer development of more successful methods such as use of academic and social skills. Extensive dissociation can also lead to inattention at school and poor memory integration. Problems resulting from these effects, such as peer rejection, could lead to added dissociation as well (Haugaard 2004b).

Lemos-Miller and Kearney (2006) found that dissociation was closely related to PTSD among maltreated adolescents at a state-administered residential facility. Four aspects of dissociation—amnesia, absorption, passive influence, and depersonalization/derealization—significantly correlated with reexperiencing, avoidance/numbing, increased arousal, and distress aspects of PTSD. The relationship between dissociation and PTSD symptoms was mediated and strengthened, however, by level of depression. The authors suggested that ongoing use of dissociation could lead to social isolation and ineffectiveness, anhedonia, poor self-esteem, and problematic cognitive and memory processes that enhance a child's risk for

developing PTSD. Other researchers affirm that dissociation and PTSD are closely linked in severely sexually abused school-aged girls (Collin-Vezina and Hebert 2005).

Dissociation is related to the affect dysregulation problems evident in many people with PTSD (Briere 2006). Such problems may interfere with remediation of dissociated emotions and likely relate to many of the biological and attachment problems discussed earlier. Affect dysregulation may result from extended periods of dissociation that prevent a child from learning to moderate excessive emotions or may result from problematic methods of thinking, remembering, or perceiving (Ford 2005). Dietrich (2007) found that adults with PTSD who were maltreated as children were often revictimized later in life and that revictimization related closely to level of affect dysregulation. In addition, maltreatment, PTSD, and borderline personality disorder are commonly linked (de Zulueta 2009; Putman 2009). Such findings fit an integrated model of maltreatment effects and PTSD based on self-regulation deficits.

### Depression and Social Support

Depression is a natural course of study regarding child maltreatment and PTSD due to the disorder's close relationship with HPA axis dysregulation and comorbidity with both problems (Harkness and Lumley 2008; Shea et al. 2004). Indeed, Linning and Kearney (2004) examined 58 maltreated youths, 37 of whom met criteria for PTSD. Maltreated youths with PTSD had significantly more comorbid diagnoses than maltreated youths without PTSD, especially with respect to any anxiety disorder as well as major depressive disorder and dysthymia. PTSD symptoms were most predicted by dysthymia and especially difficulties with concentration or decisiveness. Others have found also that depression is a leading predictor of PTSD symptoms in maltreated female juvenile offenders (Ariga et al. 2008).

Depression may be a key gateway between child maltreatment and eventual PTSD development (Storr et al. 2007). Lemos-Miller and Kearney (2006) found that trauma-related cognitions and dissociation were connected to PTSD symptoms in maltreated adolescents if a substantial amount of depression was involved. Depression in this study consisted of negative mood, interpersonal problems, ineffectiveness, anhedonia, and negative self-esteem. The authors speculated that depression was a primary gateway for precursor symptoms to lead to PTSD in maltreated youths. Others have found that maltreated children with PTSD and depression report greater levels of intrusive PTSD-related symptoms than those with PTSD only. This is especially true for reliving/flashbacks/reenactment, amnesia, and sleep problems (Runyon et al. 2002).

However, PTSD status may also moderate the relationship between number of physical and sexual assaults and depression in adolescents (Saunders 2003).

Others have examined social support as a mediator of child maltreatment and PTSD symptoms. Vranceanu et al. (2007) found that multiple forms of maltreatment in childhood (including neglect) predicted decreased social support and increased stress in adulthood. Level of social support partially mediated the relationship between child maltreatment and adult PTSD symptoms; stress fully mediated the relationship between child maltreatment and adult depression symptoms. The authors speculated that depletion of social resources over time was key to poor outcome. Schumm et al. (2006) found that women who experienced child maltreatment and adult rape were highly likely to develop PTSD but that social support greatly eased the cumulative impact of these traumas. These findings underscore the importance of discovering and enhancing buffer variables that may blunt the process from child maltreatment to PTSD.

### Cultural Factors

Cultural factors likely play an integral role in the possible development of PTSD in maltreated and nonmaltreated youth (Ferrari 2002). Some of these factors have been examined as formidable traumas in developing countries that almost certainly lead to high rates of PTSD, especially war and violence (Masinda and Muhesi 2004; Punamaki et al. 2006). Other researchers have examined maltreatment in poorer countries, finding that poverty, lack of social services, neighborhood deterioration, stressful effects of migration, lack of information about child development, health care and disciplinary practices that are harmful to youth, and other practices such as ritual and medical circumcision relate closely to this trauma (Ramos and Boyle 2001; Westby 2007). How these factors specifically relate to PTSD development is as yet unclear, but some contemporary researchers have examined certain aspects of culture and these findings are summarized here.

As mentioned earlier, Lemos-Miller and Kearney (2006) found that trauma-related cognitions and dissociation were closely related to PTSD symptoms and mediated by depression among maltreated adolescents at a state-administered residential facility. The authors further found that African American status weakened these relationships and that multiracial status strengthened these relationships. The authors speculated that emotional support, unity with family systems, church membership, and extended family networks may have buffered against psychopathology for maltreated African American youth. In contrast, maltreated multiracial youth may be more prone to poor self-esteem, identity confusion, and lack of support from other ethnic

groups and thus be more vulnerable to PTSD. Others have found that social support does not moderate a relationship between exposure to community violence, including victimization, and depressive and PTSD symptoms among African American adolescent boys. This study did not specifically examine youths maltreated by parents, however (Paxton et al. 2004).

Cultural attitudes and beliefs can enhance resilience in youth, which may blunt some effects of maltreatment and thus PTSD development (Bracey et al. 2004; Murry et al. 2001; Phillips 2004; Tummala-Narra 2007). Conversely, closely held traditional cultural beliefs may be a risk factor. Shen (2009) examined 1,924 college students in Taiwan and found that a combination of interparental violence and child physical maltreatment best predicted PTSD symptoms. In addition, subscribing to traditional Chinese views of fatalism and family harmony explained a substantial amount of variance regarding PTSD symptoms beyond violence and maltreatment. The author speculated that some students shun treatment because of pessimism and to prevent family shame.

#### Other Factors

Youth sexual preferences have also been investigated with respect to violence and PTSD. Among a large sample of lesbian, gay, and bisexual youth, many reported verbal (78%), physical (11%), or sexual (9%) victimization and 9% met criteria for PTSD (D'Augelli et al. 2006). Peer withdrawal, interpersonal problems, revictimization, and later marital problems are associated with PTSD and early maltreatment as well (Friedman et al. 2008).

Others have examined personality variables. Trauma symptoms in maltreated youth have been linked to a defensive response system in some and to an exaggerated response set in others (Fricker and Smith 2001). El-Sheikh et al. (2008) found that a child's level of emotional insecurity—defined as emotional reactivity, behavioral dysregulation, and destructive family representations—mediated a relationship between marital aggression and the child's PTSD symptoms. Saigh et al. (2007) found that youths with PTSD, some of whom had been sexually or physically assaulted, displayed significantly more state and trait anger and angry temperament than traumatized youths without PTSD. Others have found that emotional and physical abuses are more associated with anger than other symptoms of trauma (Sebre et al. 2004).

#### Comments on Risk Factors

A relatively healthy literature base has developed recently regarding risk factors for PTSD in maltreated youth, though much additional work remains needed. Greater

work is necessary to examine specific pathways that lead from maltreatment to posttraumatic stress disorder. Specific transactional effects, such as the interplay of biological diatheses and parent and family factors, require further exploration. In addition, much more specific work is needed to examine whether different patterns of maltreatment lead to different aspects of PTSD. Much of the literature has focused on physical and sexual abuse, for example, but very little work has been devoted to neglected or emotionally maltreated youth and their eventual risk for PTSD symptoms. Greater work is needed as well with respect to broader factors, especially cultural factors, which facilitate or hamper the process from maltreatment to PTSD. Mental health and other professionals have been more assiduous about developing assessment and treatment methods for maltreated youths with PTSD, and these efforts are summarized next.

#### Assessment

Full coverage of all measures applicable to maltreatment and PTSD is beyond the scope of this article, but comprehensive lists of instruments relevant to both constructs have been compiled (Hawkins and Radcliffe 2006; King et al. 2003; Stover and Berkowitz 2005; Strand et al. 2005). Assessment measures relevant to this population include structured diagnostic interviews that contain PTSD sections. Examples include the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Diagnostic Interview for Children and Adolescents-Revised and Anxiety Disorders Interview Schedule for Children for DSM-IV (Ambrosini 2000; Reich 2000; Silverman and Albano 1996). In addition, some interviews are more particularly designed for PTSD symptoms. Examples include the Clinician-Administered PTSD Scale for Children and Adolescents and Children's PTSD Inventory (Newman et al. 2004; Saigh et al. 2000).

Assessment measures for maltreated youths with possible PTSD also include child self-report questionnaires such as the Trauma Symptom Checklist for Children (and for young children) and My Worst Experience Scale (Briere 1996; Hyman et al. 2002). Another questionnaire, the UCLA PTSD Reaction Index, contains child, parent, and adolescent versions (Steinberg et al. 2004). Other measures cover constructs related to PTSD in maltreated youth such as the Adolescent Dissociative Experiences Scale and Posttraumatic Cognitions Inventory (Armstrong et al. 1997; Foa et al. 1999). Finally, some general psychopathology instruments contain items potentially relevant to PTSD in maltreated youth, such as the Child Behavior Checklist (Achenbach and Rescorla 2001).

Many special challenges exist when attempting to assess PTSD in maltreated youth. First, as mentioned, aspects of PTSD appear to be different for very young children than for older children and adults. Young children, for example, do not typically display avoidance, verbal expression, flashbacks, denial, repression, psychic numbing, fantasies of revenge or rescue, or peer withdrawal that older children do. Instead, some believe that young children's reactions to intense stress are normative and may often include short-term changes in school performance or views of the future. Other aspects of PTSD, such as dissociation and hypervigilance, exhibit differently with age. Most measures of PTSD in youth do not account well for developmental changes in symptomatology across age or cognitive or emotional level or time perception, so clinicians should use multiple methods of assessment, including behavioral observations and play representations, to determine such a diagnosis (Kerig et al. 2000; Ronen 2002).

Second, many measures of child PTSD do not account for the substantial number of contextual variables that enhance risk or buffer a child from PTSD and its comorbid disorders. Examples include prior learning experiences, resilience, family functioning, coping skills, culture, and ongoing trauma or proximity to an abuser. In addition, children often react to stress as their parents react, and parent reactions are important predictors of whether a child will eventually develop PTSD following an extreme stressor. Assessors of PTSD in maltreated youth should thus focus heavily on contextual factors, how or if a child's behavior and personality has substantially changed following the stressor, and whether important developmental tasks such as school performance are currently impaired (Hawkins and Radcliffe 2006; Ronen 2002). In related fashion, domains of impairment listed in Table 3 that may

result from extensive emotional and behavioral dysregulation in the population should be thoroughly assessed.

Third, measures of PTSD in youth tend to focus on a specific stressor and are less sensitive to maltreatment or related traumas that are more immediate, lengthy, proximal, and injurious. Greater efforts are needed to design measures specifically for maltreated youth who may have PTSD, especially for youths who have been neglected, who have experienced multiple forms of maltreatment, or who have been maltreated *and* subjected to nonmaltreatment-based traumas. Comorbidity is often deemphasized in these measures as well, so clinicians must be sure to assess for common related conditions such as depression (Lemos-Miller and Kearney 2006; Ronen 2002).

Fourth, assessing PTSD in maltreated youths involves special circumstances and risks not necessarily evident in youths who endured single-event traumas such as a natural disaster. Many maltreated children can be more suggestible or defensive during the interview process, may still show active symptoms of distress, and may react poorly to the gender of the assessor. Establishing rapport, delineating confidentiality, and emphasizing safety during the assessment process is perhaps more crucial in these cases than for other types of trauma cases. Assessors have also been encouraged to ask children to rephrase interview questions, utilize open-ended invitations, explain PTSD-related concepts such as horror, react to answers supportively, adopt patience if a child is confused or exaggerates or minimizes information, and ask direct and clear questions about specific aspects of a child's trauma and his/her reactions (Lamb et al. 2003; Newman 2002; Onyskiw 2003; Orbach et al. 2000; Stover and Berkowitz 2005). Consideration should be made as well of the extensive debate about recovered and false memories regarding abuse during assessment (see Brainerd et al. 2008; Geraerts et al. 2009; Howe et al. 2004; McNally 2007; Valentino et al. 2008).

Another special circumstance is that maltreated youth have often been separated from parents following abuse, an event that itself could be traumatic and should be covered during assessment. Indeed, women with a history of out-of-home placement have 3 times the risk for PTSD compared to controls (Schneider et al. 2009). Type of separation—such as abandonment, forced removal, or parental death or incarceration—should be considered as well. Parents may also be unavailable for assessment, may be influenced by their own PTSD symptoms, or may emphasize externalizing rather than internalizing aspects of their child's post-trauma reactions (Stover and Berkowitz 2005). In related fashion, many maltreated youths do not show evidence of PTSD symptoms until several months following abuse or removal from an abusive situation, and other youths display few or no aspects of PTSD. Use of repeated measures over time may thus be necessary (Newman 2002).

**Table 3** Proposed domains of impairment in children exposed to complex trauma

A. Biology (e.g., developmental problems, increased medical problems)
B. Cognitive (e.g., difficulties in attention, information processing, learning)
C. Dissociation (e.g., depersonalization, derealization, impaired memory)
D. Affect regulation (e.g., poor emotional self-regulation, difficulty labeling emotions)
E. Attachment (e.g., social isolation, difficulty with perspective taking)
F. Behavioral control (e.g., poor impulse control, aggression, oppositional behavior)
G. Self-concept (e.g., low self-esteem, shame and guilt, lack of sense of self)

Source: Cook et al. (2005)



Parents and youth in maltreatment cases often differ as well with respect to information provided, which may reflect self-interest or legal ramifications. Such ramifications can also influence consent to assessment and treatment (Carter-Visscher et al. 2007). Maltreated youth may also be less likely to speak to an assessor about their trauma in the presence of a parent. Finally, many maltreated youth with PTSD are minorities, which may reveal differences in reporting practices, language, self-view, locus of control, cultural and religious rituals, interpretation of symptoms, and social support that must be considered (Nader 2007; Vickers 2005).

## Treatment

Research about interventions to reduce harm from trauma in youth has flourished in recent years. Primary interventions in this regard and for PTSD in particular include debriefing as well as cognitive-behavioral, art, play, psychodynamic, and pharmacological therapies. More specific approaches include psychoeducation, hypnotherapy, grief work, affect regulation, interpersonal skills development, narrative storytelling, coping skills and stress inoculation training, school consultation, and exposure-based practices, either individually or in group format. Cognitive-behavioral approaches demonstrate the best efficacy to date (Wethington et al. 2008). A key first step to any of these therapies is to develop a close therapeutic alliance to help clients express feelings of helplessness, shame, and vulnerability and identify meanings of traumatic events and symptoms of PTSD. Safety issues such as ongoing maltreatment or proximity to an abuser must be resolved immediately as well.

Outcome for youths treated for PTSD is moderately effective, though developmental considerations and multi-source assessment strategies are not always taken into account. Important developmental modifications must be considered for variations in language and conceptual skills, emotion regulation and coping skills, comorbidity, memory, family functioning, and contextual influences. Factors that likely impact recovery include child and parent participation, comorbid behavior problems, length of treatment, and type of family functioning. Another key issue is that few youths with PTSD have access to cognitive-behavioral treatment (Caffo and Belaise 2005; Carr 2004; Feeny et al. 2004; Perrin et al. 2000, 2004; Ruggiero et al. 2001; Silva et al. 2003; Vernberg and Johnston 2001).

Research regarding treatment of maltreated youths has a more longstanding history. A primary technique includes a strong therapeutic relationship to reduce embarrassment, focus on cathartic release of anger, relieve guilt and shame, and develop a more positive self-image. Specific youth-based techniques include structured play, expressing

maltreatment-related feelings such as fear, anxiety management, changing erroneous beliefs such as self-blame and negative attributions about others, teaching maltreatment prevention skills, and reducing isolation and stigma associated with maltreatment, such as in group therapy.

An emphasis on parents includes reducing psychopathological symptoms such as depression as well as dysfunctional parenting practices. Family-based approaches to access community resources, increase cohesion, and reduce conflict and associated child behavior problems are commonly employed as well. Broader peer counseling and community programs have also been advocated, especially for cases involving domestic violence. Speed of recovery is often dictated by degree of child resilience, parental support, maternal distress, family help-seeking, and family cohesion and problem-solving ability (Daigneault et al. 2007; Geffner et al. 2003; Kolko 2000; Koverola et al. 2007; Markese 2007; Pepler et al. 2000; Ross and O'Carroll 2004).

## Posttraumatic Stress Disorder and Maltreatment

Research regarding the specific treatment of maltreated youths with PTSD has gradually inched toward a more coherent theoretical model that drives assessment and treatment decisions. This is particularly important for maltreated youths with PTSD who suffer from complex symptomatology and compounded neurobiological effects (Cohen et al. 2002). As such, several researchers have begun to develop a comprehensive framework for treatment based on cognitive-behavioral principles. These treatments largely focus on altering learning experiences that led from stressor to PTSD symptoms, reducing anxiety so a youth can adequately process strong negative emotions and trauma-related thoughts, enhancing self-regulation and positive affect, working with a nonoffending parent to boost support and decrease distress, and improving positive parenting practices, especially those related to discipline (Cohen et al. 2006; Cook et al. 2005; Ross and O'Carroll 2004).

A popular model of treatment for maltreated youths with PTSD is trauma-focused cognitive-behavioral therapy that focuses heavily on education regarding child maltreatment (especially sexual abuse), coping skills training, gradual exposure, and parent-based techniques. A general goal of this treatment is to help the nonoffending parent act as a future therapeutic agent for the youth and ease symptoms of depression, PTSD, and affect dysregulation. Much of the following description of this approach is based on Cohen et al. (2000), Heflin and Deblinger (2006) and Runyon et al. (2004).

In this approach, which generally covers 12–20 sessions, a youth is initially provided education about what abuse is and why it occurs, who is responsible for the abuse,



frequency of abuse, what types of youth are abused, how youth feel when abused, and why youth often find it difficult to tell others of abuse. Aside from education, this process allows a child to have initial, general discussions about maltreatment experiences and PTSD symptoms. Inaccurate and particularly distressful perceptions about these experiences and symptoms can be addressed at this point and later during journaling as well.

Coping skills training focuses on linking thoughts, emotions, and behaviors for a child to illustrate their interrelational effects. In addition, cognitive therapy is designed for maltreatment and nonmaltreatment scenarios to identify thoughts that underlie strong emotions such as guilt, evaluate the utility and accuracy of thoughts in these scenarios, and generate more adaptive and realistic thoughts. Journaling key thoughts and emotions and role playing to develop skills for appropriate emotional expression are important aspects of coping skills training as well.

Exposure-based practices involve hierarchies of stimuli related to intense anxiety surrounding a set of maltreatment experiences. Examples of hierarchy items include discussions of maltreatment in general, one's relationship with family members (including an offender), less stressful maltreatment experiences, and specific and detailed descriptions of the most serious offenses. Youths are encouraged to refrain from distraction and engage in emotional expression and cognitive coping skills during the exposure process. The use of written work in the form of diaries, journals, books, letters, and essays is encouraged as well.

Parent-based practices involve many of these same techniques for the nonoffending parent who must provide support for a maltreated youth. A particular focus may be placed on depression and unrealistic expectations regarding one's interpersonal and familial relationships. Parenting skills are emphasized as well to focus on appropriate disciplinary strategies, conflict resolution, handling strong adolescent emotions such as anger, and providing education about dating, sexuality, and body safety to one's children. Didactic discussions with a youth and parent are also helpful to discuss potentially dangerous situations in the future and what to do if revictimization occurs.

Cohen et al. (2004) examined 203 youths with sexual abuse-related PTSD who attended at least 3 sessions of trauma-focused cognitive-behavioral therapy or a control condition of client-centered therapy. Most (73%) participants attended all 12 sessions. Youths in the cognitive-behavioral group displayed significantly greater improvement than controls regarding PTSD symptoms and diagnosis, depression, and overall behavior problems. Parents in the cognitive-behavioral group displayed significantly greater improvement than controls regarding depression, abuse-related distress, parental support, and parenting practices. These gains were largely maintained at

6- and 12-month follow-up, though little evidence was found regarding predictors of treatment response (Deblinger et al. 2006).

Trauma-focused cognitive-behavioral therapy has also been found superior to nondirective supportive therapy with respect to anxiety, depression, sexual problems, PTSD, and dissociation (Cohen et al. 2005). Others indicate that trauma-focused cognitive-behavioral therapy remains largely effective even at 1–2-year follow-up (Deblinger et al. 1999; Feather and Ronan 2006). The approach has been described as a well-established psychosocial treatment and may be useful as well for adolescents with abuse-related PTSD and substance use disorder (Cohen et al. 2003; Silverman et al. 2008).

Related cognitive-behavioral approaches have also been found effective for maltreated children with symptoms of PTSD. King et al. (2000b) utilized 20-session child or family cognitive-behavioral treatment for 36 sexually abused youths compared to wait-list control. Child-based treatments involved psychoeducation, coping skills, relaxation training, behavior rehearsal, cognitive therapy, assertiveness training, graded exposure, and relapse prevention. Family-based treatments additionally included parent training in behavior management and communication skills. Treatments were equally effective and better than control, especially with respect to fear, anxiety, and global functioning. Smith et al. (2007) also found a cognitive-behavioral approach to be effective for youths with PTSD, some of whom had been assaulted.

Others have discussed group cognitive-behavioral therapy as a mechanism for addressing youths with PTSD, but specific work with respect to maltreated youths remains needed (Avinger and Jones 2007; Jones and Stewart 2007). Trowell et al. (2002) did find that psychoeducational group therapy was less useful than individual therapy for reducing PTSD symptoms among sexually abused children. A specifically cognitive-behavioral approach was not utilized, however.

### Pharmacological Treatment

Research into pharmacological treatment of youths with PTSD is emerging, but data are sorely needed with specific respect to maltreated youths with PTSD. Pharmacological treatment focuses on maladaptive behavioral and emotional symptoms following exposure to a stressor, especially symptoms of anxiety and depression. Such treatment also focuses on the primary neurotransmitter systems involved in PTSD, especially catecholamines, serotonin, and gamma amino butyric acid. Open trial studies have thus been conducted with moderate success for medications such as clonidine, guanfacine, mirtazapine, propranolol, risperidone, nefazadone, citalopram, and carbamazepine, but the

field trails considerably the adult literature (Cohen 2001, 2005; Donnelly 2003; Stein et al. 2009). Despite the paucity of evidence, however, medical and nonmedical personnel commonly utilize or recommend medications such as selective serotonin reuptake inhibitors to treat youths with PTSD (Cohen et al. 2001, 2003).

### Other Treatments

Other treatments have been introduced for youths with PTSD, some of whom have been maltreated. Residential trauma-focused treatment, for example, consists of a short-term approach focusing on safety, affect modulation, anxiety management, problem solving, empathy, addressing personal loss, and prosocial interpersonal relationships. A key goal is to help youths move from victimization to self-efficacy and reduced trauma-related symptoms (Rivard et al. 2003, 2004). Extension of these and related cognitive-behavioral strategies to home- and community-based treatment for maltreated youths with trauma symptoms has been advocated as well (de Arellano et al. 2005; Egeland 2009). Prevention of trauma-related symptoms utilizing these strategies as well as debriefing and psychoeducation has also been implemented, but less so for maltreated children with symptoms of PTSD (Korner et al. 2008; Kruczek and Salsman 2006; Vitiello 2004). Child–parent psychotherapy to address sensorimotor disorganization and parenting behaviors has also been shown to be effective for preschoolers exposed to martial violence (Lieberman et al. 2005).

Eye movement desensitization and reprocessing (EMDR) was originally designed for adults with PTSD, though some early work indicates its utility for maltreated children with PTSD. Ahmad et al. (2007) found that 8-session EDMR for children with PTSD, many of whom had experienced maltreatment, produced markedly reduced PTSD symptoms than controls, especially for reexperiencing symptoms. These data support other preliminary work regarding EMDR for adolescents with PTSD and the treatment has been described as possibly efficacious (Silverman et al. 2008; Tufnell 2005).

### Comments on Treatment

Promising results have been found with respect to treatment for maltreated youths with symptoms of PTSD, but several areas of focus remain. In particular, more work is needed with respect to treatment component dismantling, treatment dosage, frequency of spontaneous remission, treatment of neglected or otherwise (not sexually) abused children, timeline between trauma and treatment, adaptive functioning, and comorbidity (Lawson 2009). Cohen et al. (2006) noted, however, that existing treatment models can

likely be adapted to various traumas, developmental and symptom severity levels, and comorbid conditions. Other areas of future work include mediators and moderators of treatment response, dissemination and implementation of efficacious treatments, and investigations of the effectiveness of combined pharmacological and psychological interventions (Cohen 2005; Cohen et al. 2006; Saigh et al. 2008). Researchers will also have to decouple trauma due to family member separation from trauma related to maltreatment in their investigations.

### Final Comments

Maltreated youth have a substantial risk for developing posttraumatic stress disorder and researchers have begun to devote more effort to this critical population. A comprehensive framework for this special population that focuses on self-regulation deficits is beginning to come into view, assessment strategies have become more sophisticated, and interventions tailored to these youth have been found to be efficacious. As the field moves forward, fine-tuning in all of these areas will be helpful. For example, researchers will need to identify precisely how different aspects of maltreatment, including neglect or family separation, lead to various aspects of PTSD or lack of symptoms. In addition, greater consideration is needed of developmental changes, culture, and other contextual variables with respect to assessment measures. Finally, researchers investigating treatment of maltreated youth with PTSD have broken exciting and vital new ground. Further study is necessary regarding the treatment of neglected youth as well as specific therapeutic components most efficacious for this population that can be readily used by clinicians. The study of early intervention and preventive strategies regarding PTSD in maltreated youth should be prioritized as well.

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